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SPERM ANEUPLOIDY IN SMOKERS AND NONSMOKERS LIVING IN THE TEPLICE DISTRICT OF THE CZECH REPUBLIC

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Tobacco smoking has been shown to have detrimental effects on sperm density, motility, and structure but little was known about genetic defects in sperm. Semen samples were obtained from fifteen heavy smokers (more than 20 cigarettes per day) and 15 nonsmokers who lived in the heavily industrialized Teplice district in the Czech Republic. Smokers had significantly elevated cotinine levels in their urine and consumed more alcohol and caffeine than did nonsmokers.

Three-chromosome simultaneous fluorescence in situ hybridization (FISH) was used to characterize the aneuploidy and diploidy levels in sperm of smokers and nonsmokers. The smokers had higher frequencies than nonsmokers for all classes of aneuploidy. Significant differences were found for YY8 ($p=0.003$), 88(XorY) ($p=0.04$) and total hyperhaploid frequencies ($p=0.02$). The two groups of men did not differ in their frequencies of XY8, XX8 or diploid sperm. When compared to a group of nonsmokers from California, the nonsmokers from the Teplice district had higher frequencies of XX8, XY8, and XY88 aneuploidy.

Other measurements of semen quality included standard semen analysis, computer-aided sperm analysis (CASA), and a sperm chromatin structure assay (SCSA). The smokers and the nonsmokers did not differ significantly in any of these parameters except for percent of sperm with a round head which was elevated in smokers (4.0 ± 0.6 vs. 2.4 ± 0.2 $p=0.01$) and % PVAP (progressive velocity along the path) which was significantly lower in smokers (84.5 ± 3.0 vs. 91.3 ± 1.6 $p=0.03$).

Our results indicate that tobacco consumption is associated with an increase in the production of certain classes of aneuploidy sperm in men who show few other semen changes. Further studies are needed to determine whether tobacco products or associated lifestyle factor(s) are responsible for these effects.

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